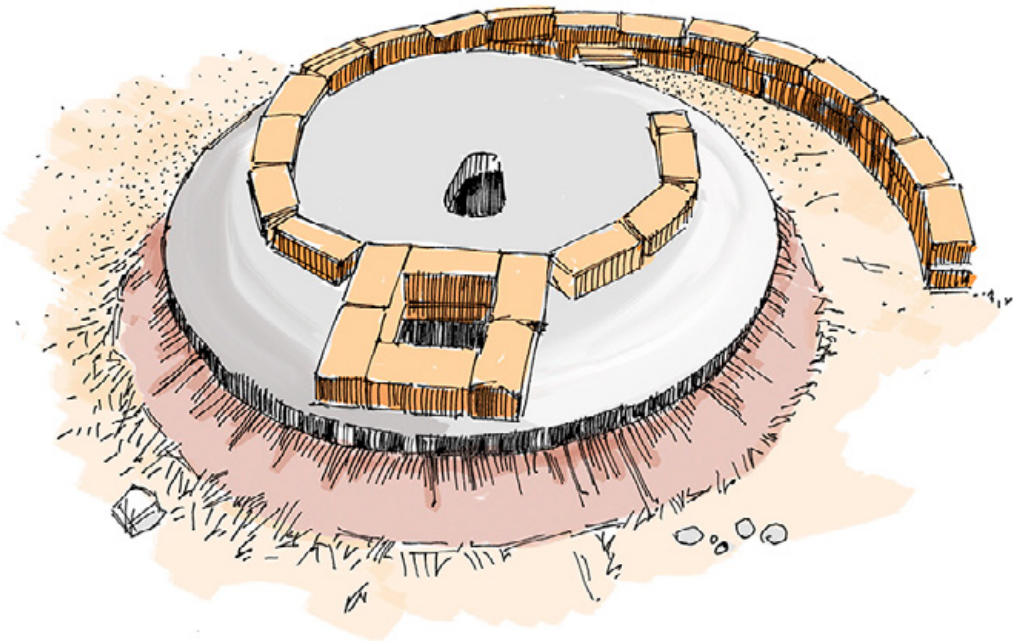
WEDC

MOBILE NOTE 10

Latrine slabs: construction materials

Introduction

Various materials can be used to make latrine slabs. There are benefits and disadvantages for each.



Loughborough University

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Properties of a slab to consider are:

- **Cost.** The slab can be the most expensive part of a latrine, especially when people dig the hole themselves and use local materials for the shelter. Factors that influence the cost of the slab include the type of materials, the skill level required to make it and transportation from where it is made to the latrine site.
- **Strength.** The slab needs to be strong enough to support the weight of the user, and perhaps someone to assist them. It needs to look strong to give people the confidence to use it.
- **Rigidity.** If a slab is too flexible, it will move under the weight of the user, which is unnerving and may discourage people from using it. This is a problem with some plastic slabs.
- **Durability.** If the slab is going to last and not collapse suddenly, it needs to

be resistant to rot and termite attack. It should also withstand repeated washing.

- **Cleanliness.** The slab needs to be suitable for cleaning. Rough wood or rough concrete quickly becomes dirty and difficult to clean.
- **Surface texture.** A smooth slab may be easy to clean, but if it is too smooth, then it may be slippery when wet. The inner surface of a pour-flush pan needs to be very smooth, so the faeces can be easily washed away.
- **Water resistance.** Urine, water for anal and menstrual cleansing and water for washing the slab will make the slab wet, so it needs to be able to withstand this and allow excess water to drain away, normally into the vault.
- **Colour.** To see if the slab is clean and to check for spiders, snakes or other creatures, users may prefer

particular colours. Cultural and religious affiliations may influence such preferences too.

- **Transportation.** A heavy slab may be too difficult and expensive to move far. A brittle slab may break in transport, requiring increased packaging and cost.
- **Ease of manufacture.** Some materials, such as plastic, require complex machinery. Concrete or wood require fewer skills and less equipment.
- **Use of local materials.** Availability of local materials can reduce the cost of manufacture and transport.
- **Reuse.** Once the pit is full, the slab may have to be moved, either to gain access to the vault so it can be emptied, or moved to a new site.
- **Environmental impact.** In areas where wood is scarce, using timber may not be a sustainable option.

Concrete

Concrete can be used to make strong, durable slabs with a smooth, easy-to-clean surface. The tools needed are readily available but training is required to ensure that the concrete is mixed and laid correctly. The slab can be made near the site of the latrine to reduce transportation problems, where often only cement and reinforcement are required to be brought on-site.

Concrete is made from a mixture of sand, stones, cement and water. Cement has to be stored carefully or it will start reacting with moisture and degrade. The mixture should be made with minimal amounts of water as excess water in the mix reduces the strength of the concrete once it has cured and set. It needs to be compacted well to eliminate air bubbles.

Once made, the slabs have to be kept damp for several days or even weeks (depending on the climate) as concrete

takes time to reach its full strength. Slabs cannot be used immediately for this reason. Flat concrete slabs cannot normally span vaults and require internal steel reinforcement and be supported by external beams.

Ferrocement is another form of reinforcement that can be used to make slabs that are thinner (and therefore lighter) than traditional reinforced concrete slabs. Ferrocement is a combination of cement and wire which is used to provide tensile strength.

Two, three or four layers of chicken wire are plastered with several layers of a rich cement mortar to make a slab about 20mm thick.

The mortar is mixed using one part cement to two parts sand, and adding enough water to obtain a thick, creamy consistency.

Screeds. The surface of the concrete slab can be left rough at first and then an additional thin layer of mortar (sand, cement and water) called a 'screed' can be applied soon after the slab is cast. This can be smoothed with a metal trowel to give a highly-polished surface.

Domed slabs

Reinforcing bars for concrete can be expensive and difficult to fix in place correctly. Plain concrete is strong when compressed (squashed) but not so strong in tension (pulled or bent). If the slab is domed, the weight of the user pushes down on the slab, compressing it. The same weight on a flat slab could cause the slab to bend and then crack, so such a slab would need to be reinforced.

Making slabs in a domed shape requires training but these skills are easier to teach than the more precise techniques required for reinforcement. Material costs are also less.

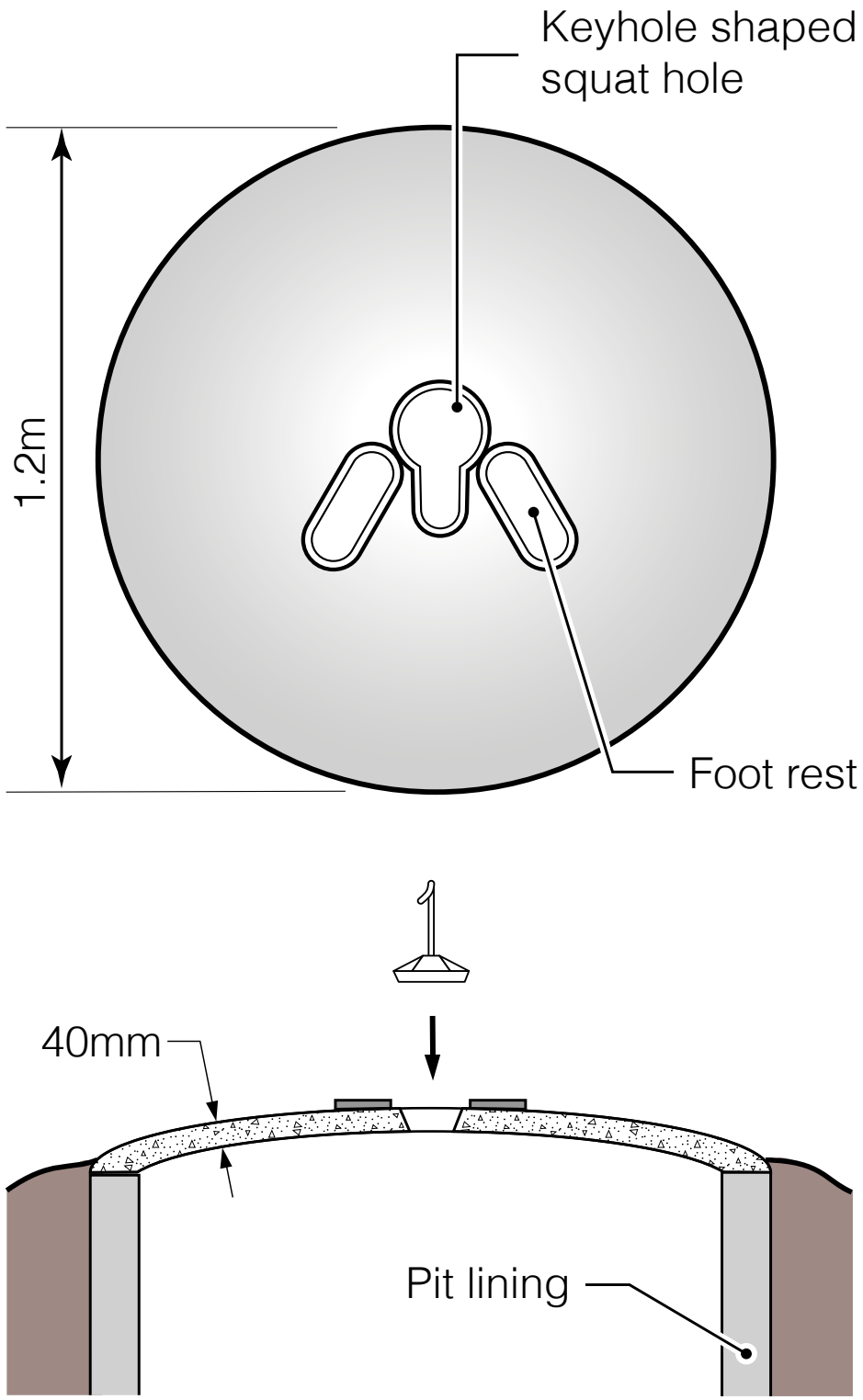

Figure 1. A domed slab

Domed slabs have a flat section around the circumference to provide a stable contact with the foundations. They are about 40mm thick and rise about 100mm from the ground. Covers should be provided as shown in Figure 1.

Sanplats

Some slabs are designed to be manufactured using both a prefabricated mould and in-situ construction. A high quality, but small prefabricated slab is used for the area where people squat to defecate, but the rest of the slab is made locally, from whatever materials are available.

The defecation slab is called a sanplat (short for sanitary platform) and provides a good method of upgrading a simple latrine, improving hygiene and appearance. Sanplats are often about 600mm square and weigh about 35kg, so they can be lifted by two people or transported on a bicycle.

Figure 2. Lifting a sanplat into place

Wood

Wood and bamboo are often available locally. Ideally, the harder the wood the better. The 'soft' timber from some tree species is susceptible to rot and termites. Such timber would require chemical treatment. A simple treatment would be to soak the timber in used oil, for example.

Planed planks will give an even surface, but the grain may trap dirt.

As an emergency solution, they are often readily available and are easy to fit.

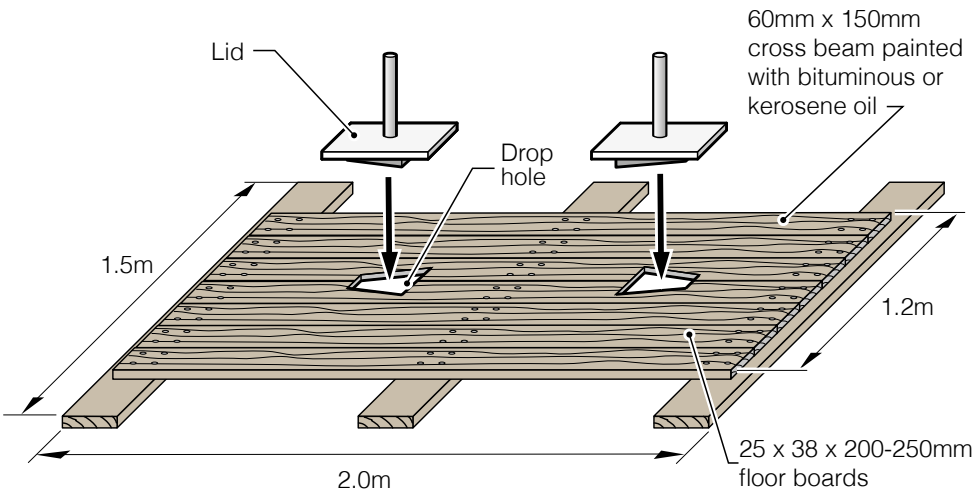

Figure 3. Slabs can be made of wood, but should be treated with preservatives

Water resistant plywood is more durable and smooth, but it is more expensive and not so readily available.

Slabs can be made from poles or bamboo tied together to form a platform, with the gaps between each pole filled with clay and smoothed to make a level surface.

Plastic

Plastic slabs can be made in various shapes that are light and durable, making them a popular choice at an industrial scale of manufacture.

Plastic can have a smooth finish for easy cleaning and ridges in the plastic can provide grip.

Plastic slabs can flex though, so they require ribs on the underside to provide rigidity. If they are too thick, they can be heavy to carry.

Other materials

Porcelain is expensive, fragile and requires specialist manufacture, but the quality of the glazed surface provides a hygienic, easy-to-clean and attractive product. Its use is restricted to pour-flush pans and pedestals that are attached to a less-expensive and more robust slab, which could be tiled for ease of cleaning.

Figure 4. The glazed surface of a porcelain pan is hygenic, but expensive

Clay or mud may be used over a framework of poles to make a smooth surface.

Mud can be mixed with animal dung or compounds produced from plants such as cassava to improve the consistency. It is cheap and does not require specialist

skills. Although it may not be durable, it can be repaired and replaced easily. It is hard to clean, however, and is damaged by wastewater and rain.

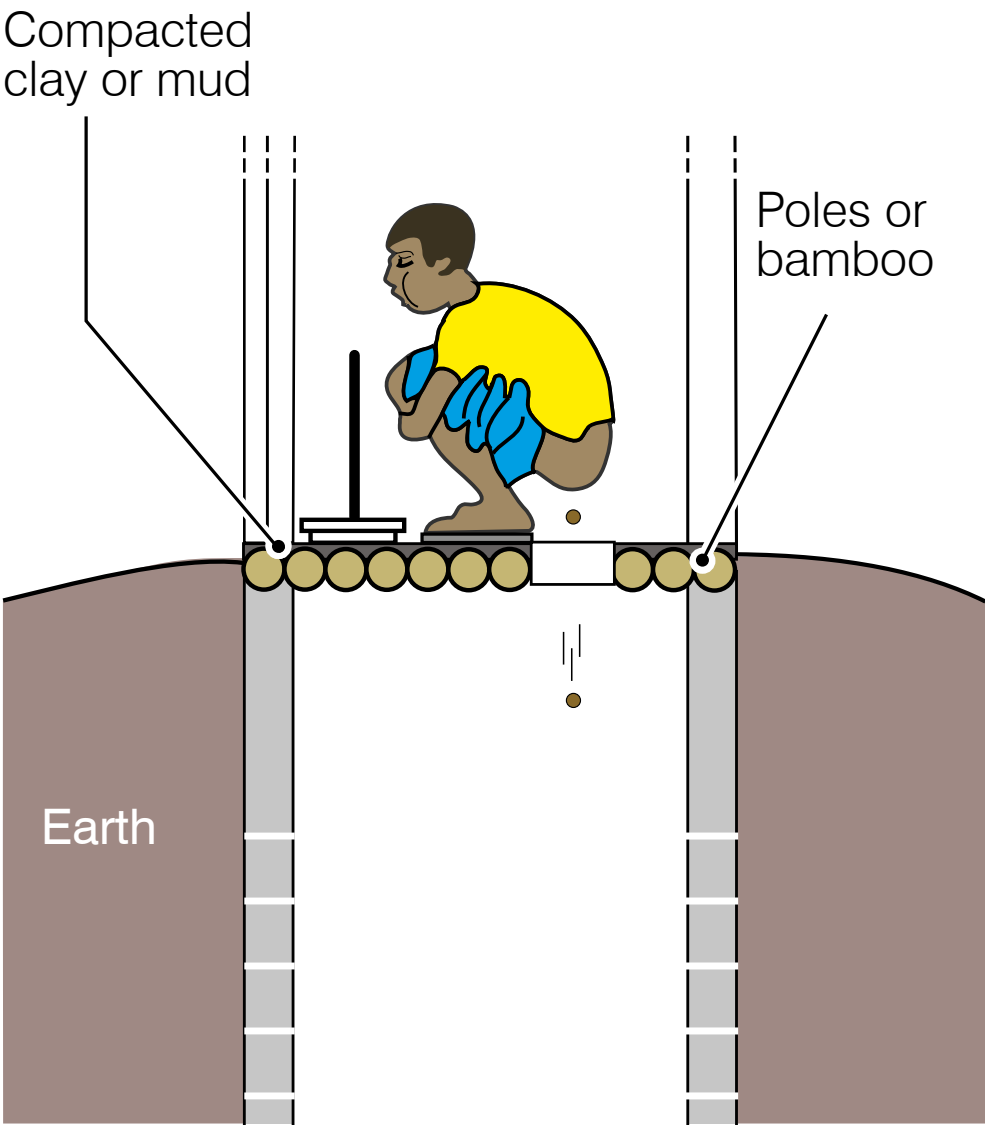

Figure 5. A slab is supported by logs, poles or bamboo with clay-filled gaps

Plastic bags. Where the slab is formed from clay or mud (either offset or over a framework of poles), parts of the slab can be lined with plastic bags to waterproof the area. Basic pour-flush pans can be constructed in this way.

Metal. Scrap metal from cars or old road signs can be recycled to form the basis of a slab.

Pedestal and seat materials

Many of the preceding comments apply to pedestals and seats as well as slabs.

However, for sitting, wood can be warmer and smoother than concrete but perhaps more difficult to keep clean. Wooden seats are simpler to make locally. Plastic can be easy to clean but, if flexible, can be disconcerting to use. Concrete blocks are strong but not very comfortable.

Painted blocks are easier to keep clean.

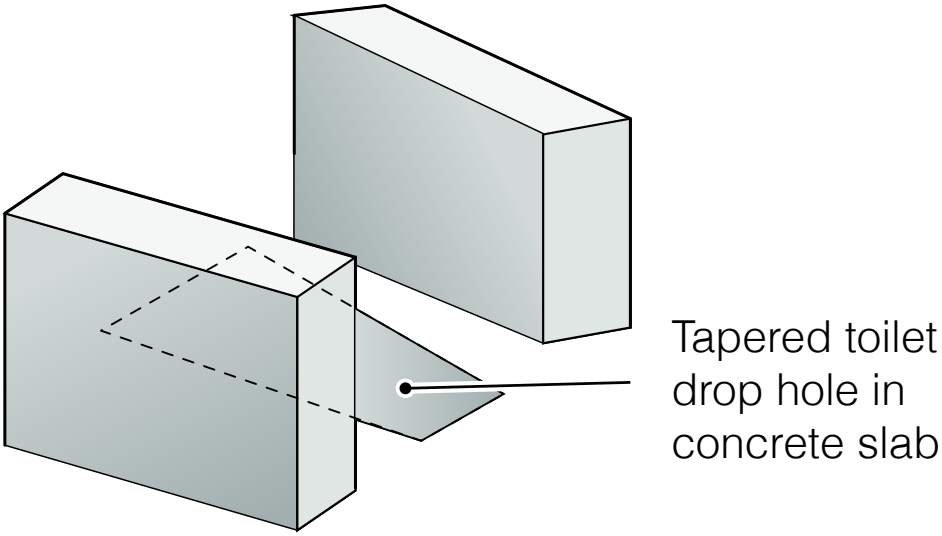

Figure 6. Concrete blocks can form a simple pedestal

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